
Acute stress enhances adult rat hippocampal neurogenesis and activation of newborn neurons via secreted astrocytic FGF2.

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Public Summary:

Stress is a potent modulator of the mammalian brain. The highly conserved stress hormone response influences many brain regions, particularly the hippocampus, a region important for memory function. The effect of acute stress on the unique population of adult neural stem/progenitor cells (NPCs) that resides in the adult hippocampus is unclear. We found that acute stress increased hippocampal cell proliferation and astrocytic fibroblast growth factor 2 (FGF2) expression. The effect of acute stress occurred independent of basolateral amygdala neural input and was mimicked by treating isolated NPCs with conditioned media from corticosterone-treated primary astrocytes. Neutralization of FGF2 revealed that astrocyte-secreted FGF2 mediated stress-hormone-induced NPC proliferation. 2 weeks, but not 2 days, after acute stress, rats also showed enhanced fear extinction memory coincident with enhanced activation of newborn neurons. Our findings suggest a beneficial role for brief stress on the hippocampus and improve understanding of the adaptive capacity of the brain. DOI:<http://dx.doi.org/10.7554/eLife.00362.001>.

Scientific Abstract:

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